5. CONCLUSION

[0099] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope being indicated by the following claims.

What is claimed is:

1. A device comprising:

an evacuated negative-pressure barrel with an aperture membrane sealing an aperture at a distal end of the evacuated negative-pressure barrel, and a housing affixed to, and sealing, a proximal end of the evacuated negative-pressure barrel;

an accelerator barrel positioned lengthwise within the evacuated negative-pressure barrel with an open proximal end fixed to the housing and opening into a chamber within the housing, and having an open distal end proximate to, and aligned with, the aperture;

a high-pressure gas source configured for filling the chamber with pressurized gas;

a trigger valve situated between, and forming a hydrostatic boundary between, the chamber and the open proximal end of the accelerator barrel;

a micro-particle positioned within the accelerator barrel at a launch point proximate to the trigger valve; and

a trigger-valve release actuator configured for abruptly opening of the trigger valve to abruptly release the pressurized gas from the chamber and into the open proximal end of the accelerator barrel,

wherein, the abruptly released pressurized gas is configured to accelerate the micro-particle from the launch point to the open distal end of the accelerator barrel and through the aperture with sufficient momentum to pierce through the aperture membrane and penetrate a sufficient depth of dermal tissue proximate to the distal end of the evacuated negative-pressure barrel to induce a micro-emergence of blood at the dermal tissue surface,

and wherein, residual negative pressure within the evacuated negative-pressure barrel is configured to draw at least a portion of blood from the micro-emergence into the evacuated negative-pressure barrel through the pierced aperture membrane.

2. The device of claim **1**, wherein the device is configured to be one of a hand-held device or a wearable device.

3. The device of claim **1**, wherein the negative pressure barrel and the accelerator barrel are both curved along a co-linear, lengthwise direction.

4. The device of claim **1**, wherein the high-pressure gas source is selected from a list consisting of a container of compressed gas, a chemically-reactive gas pressure generator apparatus, an electro-chemical gas pressure generator apparatus, and a mechanical pressure generator.

5. The device of claim **1**, wherein the accelerator barrel comprises an inner cylindrical channel having a constant interior cross-sectional shape between the launch point and the open distal end,

and wherein the micro-particle has an exterior cross-sectional shape configured to be a flush fit to the constant interior cross-sectional shape of channel and at the same time not impede free longitudinal motion of the micro-particle through the channel.

6. The device of claim **5**, wherein the interior cross-sectional shape of the inner cylindrical channel is circular and the exterior cross-sectional shape of the micro-particle is substantially circular.

7. The device of claim **5**, wherein the inner cylindrical channel comprises a nozzle segment situated between the launch point and the trigger valve, the nozzle segment being configured to cause the abruptly released pressurized gas entering from the chamber to exit the nozzle segment toward the micro-particle as a supersonic flow.

8. The device of claim **5**, wherein the inner cylindrical channel comprises a taper segment situated between the launch point and the trigger valve, the taper segment forming a backstop configured to prevent motion of the micro-particle from the launch point toward the trigger valve.

9. The device of claim **5**, wherein the trigger valve comprises a trigger barrier configured to form a hydrostatic seal between the chamber and the open proximal end of the accelerator barrel,

and wherein the trigger-valve release actuator comprises a rupture actuator configured for abruptly rupturing the trigger barrier to abruptly break the hydrostatic seal.

10. The device of claim **1**, further comprising a reservoir at the distal end of the negative-pressure barrel configured for collecting and holding the at least a portion of blood drawn.

11. The device of claim **6**, wherein the inner cylindrical channel has an inner diameter in a range from 10 μm to 250 μm,

and wherein the substantially circular cross-sectional shape of the micro-particle is circumscribed by a circle having a diameter in a range from 10 μm to 250 μm.

12. The device of claim **1**, wherein the micro-particle comprises an agglomeration of nanoparticles bound together with a biodegradable matrix.

13. The device of claim **12**, wherein the nanoparticles comprise nano-sized gold particles and the biodegradable matrix comprises polylactic-co-glycolic acid.

14. A device comprising:

an outer barrel with an aperture at a distal end, and a housing affixed to a proximal end;

a hydrophilic absorptive wick in the outer barrel, unobstructively surrounding at least a portion of the aperture;

an inner barrel positioned lengthwise within the outer barrel with an open proximal end fixed to the housing and opening into a chamber within the housing, and having an open distal end proximate to, and aligned with, the aperture;

a high-pressure gas source configured for filling the chamber with pressurized gas;

a trigger valve situated between, and forming a hydrostatic boundary between, the chamber and the open proximal end of the inner barrel;

a micro-particle positioned within the inner barrel at a launch point proximate to the trigger valve; and

a trigger-valve release actuator configured for abruptly opening of the trigger valve to abruptly release the pressurized gas from the chamber and into the open proximal end of the inner barrel,

wherein, the abruptly released pressurized gas is configured to accelerate the micro-particle from the launch point to the open distal end of the inner barrel and through the aperture with sufficient momentum to penetrate a sufficient depth of dermal tissue proximate to the